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**COGNITIVE BEHAVIORAL DETERMINANTS OF
EXERCISE PARTICIPATION
IN A STRUCTURED PROGRAM**

**By
LAURIE E. JOHNSON**

**A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN
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MASTER OF SCIENCE IN NURSING**

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2002

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Abstract Of Thesis Presented to the
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COGNITIVE BEHAVIORAL DETERMINANTS OF EXERCISE PARTICIPATION IN
A STRUCTURED PROGRAM

By

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May 2002

Chair: Meredeth A. Rowe, Ph.D.
Major Department: Nursing

Lack of exercise is a chronic problem in the United States today. Many health problems such as obesity, heart disease, diabetes, osteoporosis and some forms of cancer have been directly related to sedentary lifestyles. Mental health has also been positively correlated with exercise. However, women are more likely than men to be sedentary, and older women are among the least active group. Therefore, research that examines the variables involved in why people choose to exercise are important since it may help the medical community learn the best ways to motivate people to adopt a habit of exercising.

There are many components of behavior that have an impact on why people decide to behave in a certain way. By breaking down these components and examining them independently, specific aspects of behavior may stand out as more important in influencing action with regard to exercise. Behavioral psychologists have been studying these concepts for years and many theories have emerged that attempt to explain human behavior. Icek Ajzen's theory of planned behavior and Albert Bandura's self-efficacy

theory are two of the leading theories that attempt to explain behavior. This study compared two groups: one group of women who had volunteered for an exercise study (volunteers), and another group who were eligible for the same study but who chose not to participate (non-volunteers). Self-efficacy and the theory of planned behavior were examined to see if their constructs were determinants for exercise participation in a structured program for this group of older women.

The study showed that self-efficacy was statistically significant for explaining a difference between the groups while the constructs of the theory of planned behavior were not significant, although small sample size ($n=39$) limited the study. Findings support the use of self-efficacy theory to increase exercise participation.

CHAPTER 1 INTRODUCTION

Background of the Problem

The benefits of physical activity are well established, and emerging studies continue to support an important role for habitual exercise in maintaining overall physical and mental health and general well-being. Blumenthal et al. (1999) reported that participating in an exercise program reduced depression, while McAuley et al. (2000) demonstrated that an exercise intervention improved subjective well-being. Hassmen, Koivula and Uutela (2000) supported a consistent association between enhanced psychological well-being and exercise, and Paffenbarger et al. (1993) as well as Andersen, Schnohr, Schroll and Hein (2000) found that individuals who are physically active live longer than those who are inactive.

The public health benefits of increasing the physical activity of the general population is potentially enormous due to both the prevalence of sedentary lifestyles and the impact of activity on disease risk. These potential benefits are amplified for the elderly population who are at much greater risk for chronic disease. However despite governmental mandates and strong evidence supporting the health benefits of regular physical activity, the overall participation rates continue to decline. Less than one-third of adults engage in the recommended amount of physical activity, and 40 percent of all adults engage in no leisure-time physical activity (U.S. Department of Health and Human Services, 2001a). Specific challenges for the future include identifying key determinants

of physically active lifestyles among the diverse populations in America so that public health efforts can be appropriately targeted to encourage participation.

Purpose

The purpose of this study is to examine the cognitive behavioral determinants of participation in a structured exercise program. Two theoretical frameworks will guide this study. The theory of planned behavior and self-efficacy theory will be tested to see if either predicts intentions to exercise in this population. This study will examine two groups, the study volunteers and study non-volunteers. The study volunteers are women who are currently participating in a different research study involving exercise. They will be compared to the non-volunteers who are women who chose not to participate in the exercise study. Results may provide information that is useful for healthcare practitioners as they create strategies to encourage patients to improve their own health through exercise habit adoption.

Research Hypotheses

The research hypotheses of this study were conceived to test the dependent variables (self-efficacy, fitness attitude, perceived behavioral control and expectations of others) as they affected the independent variable (volunteer status of women eligible for the exercise study). Hypotheses of the study are as follows:

1. Women who volunteered to participate in the exercise study (volunteers) will have higher scores on the exercise-related items of an osteoporosis self-efficacy instrument than women who did not volunteer (non-volunteers).
2. Women who volunteered for the exercise study (volunteers) will have a more positive attitude toward fitness as measured by the Fitness Attitude Scale (FAS) than women who did not volunteer (non-volunteers).
3. Women who volunteered for the exercise study (volunteers) will perceive that their significant others have higher expectations for them as measured by the

Expectations of Others Scale (EOS) than women who did not volunteer (non-volunteers).

4. Women who volunteered for the exercise study (volunteers) will perceive that they have more control over their behavior as measured by the Perceived Behavioral Control Scale (PBCS) than women who did not volunteer (non-volunteers).

Operational Definitions

For purposes of this study, the following definitions of terms are used:

1. Study volunteers: those individuals who came on their own volition to participate in the exercise study. This includes individuals who were randomized to the exercise group as well as those assigned to the control group.
2. Study non-volunteers: are those individuals who were able, eligible and available to participate in the exercise research study but who chose not to participate.
3. Self-efficacy: defined by Bandura as one's confidence in personal ability to undertake a certain task or behavior. Exercise subscale items from the Osteoporosis Self-efficacy Scale (OSES) will measure exercise self-efficacy.
4. Significant others: specific persons in one's life that they consider important. This may include a parent, spouse, lover, friend, child, physician, or nurse. Significant others will be operationally defined by each individual.
5. Expectations of others: beliefs about what certain significant others think they should do. The EOS will measure expectations of others regarding exercise behavior.
6. Fitness attitude: the ability to do your daily activities with vigor and without becoming tired. This will be measured by the FAS.
7. Perceived behavioral control: a person's feelings regarding the degree of control they have over their own personal behavior. Barriers to action will sometimes render a person feeling like a behavior is not within their control. Perceived behavioral control is the degree of control felt by a person even in the face of barriers. It will be measured by the PBCS.

CHAPTER 2 REVIEW OF LITERATURE

Introduction

The review of literature revealed a wealth of information regarding the significant health problems caused by a lack of exercise: (1) the obesity epidemic, (2) decline of physical health as a result of sedentary lifestyles, and (3) depression and mental illness. There is also substantial evidence that even modest amounts of regular exercise can result in significant improvements in these three areas. However, there is much less conclusive material available on the best strategies to entice older persons to participate in exercise. There also exists a disparity in exercise research on men and women. This disparity will be discussed, as well as studies on older adults and the determinants of exercise. Exercise research using the theories of planned behavior and self-efficacy will be presented.

Obesity Epidemic and Mortality

Obesity, is a rapidly growing trend. The World Health Organization (Hartl, 1998) characterizes obesity as a health problem reaching epidemic proportions in the United States, and in many other countries. Allison, Fontaine, Manson, Stevens and VanItallie (1999) conducted a meta-analysis of 6 large prospective cohort studies to determine the mortality impact of the obesity epidemic. These studies looked at body mass index (BMI) distributions for overweight, obese and severely obese individuals and overall

deaths in 1991. Findings revealed the odds for death were significantly higher for obese and severely obese distributions than for those in optimal weight categories.

Flegal, Carroll, Kuczmarski and Johnson (1998) reported that one third of Americans are overweight, and they demonstrated the evolution of obesity trends over a 35-year period in the U.S. as they compared published statistics from successive cross-sectional nationally representative surveys. Data from the National Health Examination Survey (1960-1962) and the NHANES I (1971-1974), NHANES II (1971-1974) and NHANES III (1988-1994) were compared in their research to reveal trends over the years represented. These results reveal a marked increase in obesity over the three decades from 12.8% to 22.5%.

Additionally, in their cross-sectional survey study of adults, Mokdad et al. (1999) further substantiated this unhealthy trend. They analyzed survey data of over 100,000 participants from the CDC's behavioral risk factor surveillance system (BRFSS) for the years between 1991 and 1998. The prevalence of obesity increased from 12% to 17.9% between 1991 and 1998. Increases occurred in all states in both genders, across every age group, race, and educational levels. The rapid increase in obesity demands future research, especially behavioral research on the best ways to motivate people to exercise.

Sedentary Lifestyles and the Decline of Physical Health

The Surgeon General's call to action to prevent and decrease overweight and obesity states: Less than one-third of adults engaged in the recommended amount of physical activity, and 40 percent of adults engaged in no leisure time activity. (U.S. Department of Health and Human Services, 2001a). Sedentary lifestyle choices are wreaking havoc on the health of many American people. As the NIH Consensus Statement reveals, greater numbers

of people are at risk for heart disease from sedentary lifestyles than from any other single risk factor (National Center for Health Statistics, 1995). Research reviewed below demonstrates the link between exercise and cholesterol, high blood pressure, osteoporosis and all cause mortality.

Cholesterol and Inactivity

In their cross-sectional population based study Gardner, Tribble, Young, Ahn and Fortmann (2000) demonstrated that unhealthy cholesterol levels are associated with inactivity and excessive body weight. Correlations between lifestyle factors (such as body mass index (BMI), daily exercise, smoking, diet and alcohol intake) and lipid profiles were analyzed. BMI was the strongest independent correlate of poor lipid levels and in turn a higher relative risk for cardiovascular disease also due largely to sedentary lifestyles.

Blood Pressure and Exercise

Exercise is positively linked to maintaining a healthy blood pressure in women. In a long-term exercise intervention study, Cox, Puddey, Burke, Beilin, Morton and Bettridge (1996) found that lower resting BP measures were consistently related to ongoing participation in any regular exercise. This remained true even if fitness goals were not achieved, demonstrating the importance of adopting moderate exercise as a lifelong habit rather than a sporadic practice to reach a certain goal. The findings regarding moderate exercise may be a key to getting a previous sedentary population up and going since it may be easier to influence a gradual lifestyle modification rather than vigorous exercise.

Osteoporosis and Exercise

A decline in the mass and integrity of the skeletal bones are well known consequences of aging (Taaffe & Marcus, 2000). In the past, this was believed to be normal, progressive and inevitable. Now studies are revealing that osteoporosis can be somewhat reversed or halted by regular weight bearing exercise. Bravo et al. (1996) conducted a randomized control trial with 124 post-menopausal osteopenic women between 50 and 70 years. Twenty percent of the women were sedentary and only 5% were categorized as rather active. For the intervention group a program of weight bearing exercises, aerobics and flexibility was conducted for 60 minutes three times per week over 12 months. Post intervention, subjects demonstrated a 30% increase in spinal bone mineral density (BMD). Flexibility, agility, strength and endurance as well as psychological well-being were all favorably affected post intervention as demonstrated by 10% -12% increases over the control group.

Exercise and Mortality

Sedentary persons who improve their physical fitness are less likely to die of all causes, even after genetic and other familial factors are taken into account. Kujala, Kaprio, Sarna and Koskenvuo (1998) demonstrated this in their longitudinal twin cohort study investigating leisure physical activity and mortality. Using a sample of nearly 16,000 subjects followed from 1975 to 1995, they accounted for familial patterns during childhood (elicited via questionnaire) as well as lifetime habits with respect to physical fitness (measured in classifications of sedentary, occasional exercisers and conditioning exercisers). Reduced mortality was demonstrated in subjects that engaged in more lifetime activity.

Lack of exercise has been associated with increases in mortality and morbidity from illness. Blair, Kohl and Barlow (1993) conducted a cross-sectional, non-experimental cohort study of 3120 adult women. Fitness was measured via a treadmill test, and physical activity by self-report study. They found that death from all causes was inversely associated with physical fitness, further validating the importance of an active lifestyle.

Exercise and Mental Health

In a review of 38 research studies, McAuley and Rudolph (1995) found that the direct relationship of physical activity to mental health/well-being was consistent across age and gender. Furthermore, McAuley, et al. (2000) state that well over 90 reviews have been published that suggest physical activity participation is associated with an improved sense of psychological well-being. The implications for improved mental health through stress reduction and lowered anxiety also translate into improved physical health.

Several randomized controlled trials have found that exercise, alone or combined with other treatments, improves mild to moderate depression. For instance, Hassmen, Koivula and Uutela (2000) conducted a cross-sectional study of 3403 surveyed participants. They found that individuals who exercised at least two to three times a week experienced significantly less depression, anger, cynical distrust, and stress than those who exercised less (or not at all). This finding was consistent using a variety of psychological inventories for measurement. Additionally, McAuley et al. (2000) demonstrated in a randomized controlled trial that physical activity interventions had a positive effect on subjective well-being in older adults. A sample of 174 sedentary adults

aged 60 to 70 years old were randomized to groups of either aerobic exercise, or toning and stretching for a 6-month intervention period. Subjective well-being (SWB) significantly improved over the intervention course for both groups, implying that intense exercise as well as moderate toning and stretching both contributed to the individual's feelings of happiness, satisfaction and social support (the 3 measured constructs of SWB). At 6 months post intervention, these SWB improvements were reversed indicating the necessity of continued exercise for ongoing results.

Exercise holds significant promise when compared side by side with conventional treatments for depression. Blumenthal et al. (1999) assessed the effectiveness of an exercise program compared with medication for treating depression. In a randomized controlled trial, 156 depressed subjects over 50 years of age were randomized into one of three treatment groups: an exercise program, antidepressant medication or combined therapy. Over a 16 week exercise intervention, the exercise was equally effective as medication in treating depression in this trial. Patients who are candidates for this exercise prescription will enjoy physical and mental health benefits without the side effects accompanying many antidepressant medications.

Women and Exercise

Physical inactivity is more common among women than men. A U.S. Department of Health and Human Services report (1996) from the U.S. Surgeon General states: More than 60 percent of U.S. women do not engage in the recommended amount of physical activity, and more than 25 percent are completely sedentary. This finding is more prevalent as women age. Scharff, Homan, Kreuter and Brennan (1999) conducted a non-experimental, cross-sectional study of women using a convenience sample of people

waiting at physician's offices. Self-administered behavioral and health questionnaires were completed by 653 subjects. Physical activity characteristics such as demographics were obtained in order to identify factors that associated with different stages and ages in women's lives. Subject's physical activity levels were determined by combining leisure time activities with their physical activities of daily living. Findings revealed younger women were more physically active than older women. Nearly twice as many women younger than 30 years reported adequate levels of physical activity when compared with women in their sixties. This finding demonstrates the need for communicating the importance of exercise to older adult women, thereby improving their quality of life.

Facilitators and Barriers to Exercise

Research on exercise facilitators and barriers have explored reasons for the increased inactivity of women. Many women view barriers in their lives as a reason for their lack of exercise as discussed by Nies, Vollman and Cook (1999) in their qualitative research on a group of African American women. Homogeneous focus groups of a minority population discussed their experiences with exercise, in order to study facilitators and barriers to exercise. Sixteen healthy African American women aged 25-50 were assigned to groups that included both employed and unemployed members with mid to low income. All participants lived in an urban area. A daily routine and access to a practical, convenient, and safe space for exercise were identified as the most common exercise facilitators. Additionally, weight loss, stress reduction and enjoyment were personal goals found to facilitate and encourage participation. The most commonly cited barriers to exercise included lack of child care, lack of an exercise partner, and competing daily schedule responsibilities. The psychological determinants of exercise behavior

found in this study are encouraging as a springboard for increasing the exercise behavior of women. Interventions that foster peer support may increase participation by enhancing the positive experience (Nies, Vollman & Cook, 1998).

Disparity in Exercise Research on Women

Despite a myriad of physical activity studies on men, far fewer studies have examined the health benefits of exercise in women. Because of the disparity of the research, the most effective behavioral strategies for encouraging women to begin or maintain an exercise program are unknown. Finding the best way to incorporate a structured exercise program into a daily lifestyle routine is a challenge for future researchers. A U.S. Surgeon General report on physical activity and health found that women were included in only 8 of 55 population based studies on physical activity and fitness (U.S. Department of Health and Human Services, 1996). There is limited empiric based information on determinants, barriers and adherence factors for women.

Exercise and Older Adults

New demographic trends will characterize the next decade with proportionately older people in the population. In 1996, Tauber estimated that the new millennium would usher in a United States with one out of five people older than 65 years of age. Older adults hope to remain independent until death, but their inactivity, poor nutrition and disabling diseases contribute to loss of function. Therefore, exercise is even more important in the older adult since they are at increased risk for muscle weakness, falls and fractures (Fried et al., 1998).

Although exercise has been shown to improve functional ability, inactivity continues to increase with age. Sedentary habits can cause significant alterations in the

elder person's quality of life and independent living ability. However, improvements in physical health are still possible, even into old age. Lord, Ward, Williams and Strudwick (1995) conducted a randomized controlled trial to determine whether a program of regular exercise can improve balance and strength and reduce falls in older women. Elderly women aged 60 to 85 years were randomly recruited from the community for a 12 month exercise intervention. Exercises targeting sensorimotor functions, muscle strength, reaction time, and neuromuscular control were conducted for one hour sessions twice per week. At the end of the study, the exercise group had significant sensorimotor improvements in all measures, demonstrating that exercise can play an important role in improving stability and related factors even in the elderly.

Barriers for the Elderly

In a literature review, Rhodes et al. (1999) observed that perceived physical frailty and poor health might provide the greatest barrier to exercise adoption and adherence in the elderly. Frail elderly individuals potentially have the most to gain from exercise by maximizing their residual function. Ironically, exercise might be the one intervention to improve the frailty and health of this population. Even elderly with disabilities can increase their quality of life by increasing their fitness level. Jette et al. (1999) conducted a randomized controlled trial with 215 sedentary older adults with disabilities to compare the effects of a home based resistance training program of videotaped exercises performed in the participant's home 3 times each week for 6 months. Cognitive and behavioral strategies enhanced exercise attitudes and thereby increased program adherence. Findings revealed improved lower extremity strength and gait. Furthermore, reduced physical and overall disability was found at 6-months follow-up. Implications

are encouraging to medical professionals who are in the position to prescribe exercise to their clients, especially those who are disabled.

Health Promotion for the Elderly

Traditionally, older people were not targeted for health promotion activities. Anderson, Ory, Cohen and McBride, (2000) in their research review of aging and health interventions, assert that many older adults will be active participants in and receive benefits from health promotion research interventions if they are appropriately recruited. Therefore, older populations should be targeted for exercise interventions well into their later years and encouraged to continue exercising as long as they are able. A report of the Surgeon General on physical activity and health (U.S. Department of Health and Human Services, 1996) implores older people to enjoy the benefits of regular physical activity, specifically muscle strengthening exercises to improve their ability to live independently.

National public health objectives in the Healthy People 2010 guidelines call for increasing physical activity in all segments of the population (U.S. Department of Health and Human Services, 2001b). Furthermore, the CDC and the ACSM indicate the greatest reduction in mortality risk is achieved by moving a sedentary population toward moderate activity (Pate, 1995). Thus, public health goals for the future include getting greater numbers of people to be more active. The purpose of this study is to assist clinicians in understanding the characteristics of people who are likely and not likely to participate in formal exercise.

Determinants of Exercise

A determinant is a fact, circumstance or situation that determines the nature of something, or conditions an outcome. It refers to an individual's beliefs or thoughts that in-turn influence behavior (Merriam-Webster, 2001).

Determinants of initiation and maintenance of exercise have been studied in hopes of identifying factors that could be associated with increased exercise behavior in older persons. Burton, Shapiro and German (1999) conducted a longitudinal study of Medicare beneficiaries (age 65 and over) spanning 4 years in order to describe behavioral change over time with respect to physical activity. Physical activity was assessed by self-report, and included walking briskly, gardening or heavy housework at least 3 times per week. Subjects were contacted initially at baseline, then at two and four years. Sixty percent of the initial sample of 2,507 completed the entire 4 year study period. Structured telephone interviews were used to determine characteristics of the patient population with relation to exercise throughout the study. Significant differences between the active and sedentary groups were identified. Characteristics of the more active group included: being younger, white, male gender, married, more educated, healthier, and having less emotional stress. Psychosocial factors positively identified with being physically active were having greater self-mastery (self-efficacy), having a confidant (significant other) and holding positive health beliefs about activity. Health care providers can implement these findings to target exercise interventions to older adult groups that are more likely to be sedentary.

Sherwood and Jeffery (2000) discuss current research on behavioral determinants of exercise in their comprehensive literature review. Physical activity, they conclude, is a complex dynamic process that involves both individual and environmental

characteristics. According to Dishman (1994) who has been published extensively in the exercise field, nearly 20 cognitive variables regarding exercise have been studied since 1988. Among these, self-efficacy (SE) has received the most support as a determinant of exercise behavior, therefore, SE is one of the theoretical constructs used for this study.

Theoretical Framework

Research is strengthened by the use of theories to investigate a problem.

Theoretical frameworks can help guide research by hypothesizing relationships between concepts in order to explain behavior. Variables that influence behavior must be identified before interventions can be applied. Therefore, the benefits offered by theory based interventions are that they provide a systematic framework for understanding the rationale behind interventions.

If theory can predict who will and who will not exercise, new interventions can be created and targeted toward the population who are the least likely to exercise. This sedentary population could receive the most health benefits from such a behavior change. In order to better understand exercise participation in a structured program for elderly females, the theoretical framework for the basis of this study will apply two previously supported prominent behavioral theories for use in exercise: the theory of planned behavior, and self-efficacy theory.

The Theory of Planned Behavior

Evolution from the TRA to the TPB

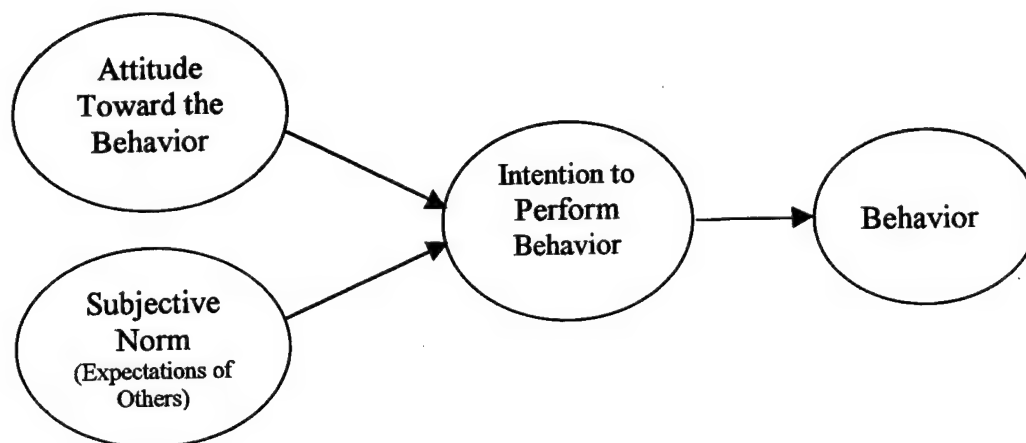
The theory of planned behavior (TPB) is a theory that was expanded from an initial behavioral theory the theory of reasoned action (TRA) proposed by Fishbein and Ajzen in 1975. The TRA attempted to understand and predict social behavior in various

situations. The TRA was focused on behavior at the level of individual decision-making, and examined how individuals moved from intentions to actions (Fishbein & Ajzen, 1975).

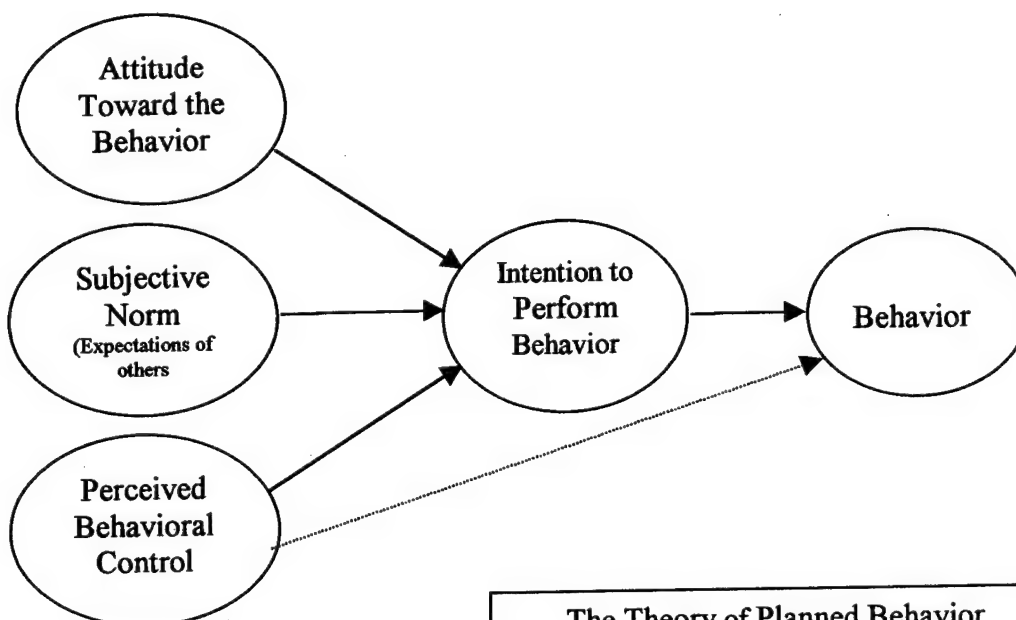
According to this model, behavioral intentions were thought to be the single best predictor of a person's behavior. Further study, however, yielded another element; for some behaviors, the attitude toward the behavior may come before the intention. After continued application of the model, Ajzen noted that an individual's perception of personal control over a behavior influenced both their intention to perform it and the actual follow through. The more positive an individual's perceived behavioral control over physical activity participation, it seemed, the stronger the intention to perform it. Ajzen expanded the theory to include a new component called "perceived behavioral control" and in 1988 named it the theory of planned behavior (TPB). The TRA asserts that personal behaviors are under volitional control and are determined by a person's intentions while the TPB asserts some behaviors are not necessarily under complete volitional control, but are influenced by intention (Blue, 1995). See figure 1 for diagrams comparing the two theories.

Since exercise behavior can be influenced by time, facilities, health status, social support and self-efficacy as well as many other factors, many people view exercise as being out of one's control. Furthermore, Blue (1995) conducted a critical review comparing the two theories with respect to exercise research and found that the TPB is a more promising framework for the study of exercise. The TPB includes beliefs about factors that may influence exercise behavior. Therefore, the TPB is more applicable to exercise behavior than the TRA and will be used as a theoretical model for this study.

The purpose of the TPB is to predict and understand motivational influences on behavior that are not under the individual's volitional control and to identify how and where to target strategies for changing behavior. These concepts will be examined in this study as they apply to elderly women's exercise participation in a structured program.



Theory of Reasoned Action
Blue, Wilbur, Marston-Scott (2001)



The Theory of Planned Behavior
Blue, Wilbur, Marston-Scott (2001)

Figure 1: AJZEN'S THEORY OF REASONED ACTION COMPARED WITH A MODEL OF THE THEORY OF PLANNED BEHAVIOR

Constructs of the Theory of Planned Behavior

The most powerful predictors of intention are attitudes, social norms and perceived behavioral control. As Ajzen (2001) explains, the more favorable the attitude and subjective norm, the greater the perceived control and the stronger the person's intention to perform the behavior. Attitudes and social norms are shaped by personal beliefs about a behavior in question. Individuals' personal beliefs are formed as an integration of culture, family and society. Perceived behavioral control is influenced by personal beliefs regarding the ease with which a behavior can be executed. Lack of physical ability as well as circumstances can affect individuals' perceived behavioral control.

The TPB has been used as a framework for predicting health related behaviors such as smoking behavior (Hanson, 1997) and mammography (Skinner, 1994), and it has been widely used as a framework for predicting exercise behavior, as shown below.

Kerner and Grossman (1998) tested the effectiveness of each construct of the TPB in explaining exercise behavior in a population of professional management personnel. They measured attitude toward fitness, subjective norm, perceived behavioral control and intention to exercise using 4 rating scales. Frequency of exercise behavior was measured over a 5-month period with 73 subjects. A positive relationship between fitness attitude and intention to exercise was found as well as a positive relationship between subjective norm and intention to exercise. No significant relationship was found in this study between perceived behavioral control and intention to exercise, probably because the group tested very high for both variables. However, overall the TPB was

useful in predicting exercise behavior, and might provide insight regarding specific exercise motivation for each client.

Conn (1998) used the TPB as the framework for qualitative interviews with 30 older women (from 65-90 years) to identify descriptive characteristics of their beliefs in relation to physical activity. Open-ended questions were designed to elicit responses that would identify the women's behavioral beliefs, normative beliefs and perceived control beliefs regarding physical activity. The most common belief mentioned by 26 out of the 30 person sample was the social advantage offered by physical activity. Other frequently mentioned items were improving social life, positive effects of being with others, enhanced mood, increased independence/functional ability, continued ability to help others, and increased quality of life. Psychological and social benefits of exercise in this group were considered more important than the physical and health benefits. Interpretation of these findings demonstrates the importance of social norms (expectation of others) and an individuals' attitude regarding exercise and supports the theoretical constructs of the TPB.

Self-Efficacy Theory

Similarity of the two models

Godin (1994) writes in his theoretical review that the notion of planned behavioral control is similar to Bandura's concept of self-efficacy beliefs. Planned behavioral control reflects personal beliefs as to how easy or hard adoption of the behavior might be. Therefore, Bandura's self-efficacy theory was chosen as the other framework to guide this study.

Self-efficacy (SE), a concept conceived by Bandura in the seventies and derived from social learning theory, has been recognized as a useful predictor of health behavior change and maintenance (Fitzgerald, 1991, McAuley and Jacobson, 1991). Self-efficacy theory has been successfully applied in explaining exercise behavior in a variety of situations. It has been used in predicting individuals who would be more likely to begin and maintain an exercise program (McAuley, 1993).

Self Efficacy Defined

According to Bandura (1977), SE refers to people's judgments of their capabilities to organize and execute the actions necessary to successfully perform a behavior despite potential barriers. Bandura (1986) explains that people who have a strong sense of efficacy exert greater effort to master challenges when compared to those who have doubts about their capabilities. People's belief in their self-efficacy affects almost everything they do. It influences how they think, motivate themselves, feel and behave.

Self-efficacy theory explains behavior in terms of how one thinks about their abilities to successfully perform a desired behavior. Informally, SE describes a positive "I think I can" mentality concerning a specific task. SE is not concerned with actual skills, but with judgments of what one can do with the skills possessed (Bandura, 1986).

Self-efficacy information is derived from four sources:

1. Personal performance accomplishments – successful experiences will increase SE, while failures decrease it.
2. Vicarious experiences – observing another person's success will facilitate SE.
3. Verbal persuasion – suggestion, when a person then tries a behavior based on instruction or verbal encouragement and succeeds, SE is further strengthened.

4. Physiologic state – personal interpretations of physiologic arousal to situations will influence efficacy. A cycle that entertains negative thoughts and perpetuates more arousal to be set into motion and thinking that is more negative will shatter efficacy beliefs while lower arousal states usually facilitate SE.

Self-efficacy has been widely used in behavior change research. Fitzgerald (1991) reviewed SE studies involving health behaviors such as smoking cessation, weight control, cardiac rehabilitation, functional status and return to work in cardiac patients. A consistent link between SE and behavior maintenance was demonstrated in all of the reviewed studies.

McAuley (1993) tested SE concepts in a non-experimental post intervention follow-up study of 88 middle-aged sedentary adults. At completion of a 5-month exercise intervention program, measures of personal SE for exercise were taken, as well as other items hypothesized to be predictors of future exercise behavior (VO₂, & program attendance). Four months post-intervention, structured telephone interviews elicited details of exercise participation. Additionally each subject's spouse or significant other was interviewed by telephone to corroborate the information received from participants. Self-efficacy was the only variable that significantly predicted exercise behavior over the 4-month follow-up period.

According to Bandura (1986), the greater one's SE the more likely it is for the person to persist in the face of difficulty. Perceived SE can determine whether an individual attempts a given task, the degree of persistence, and the ultimate success. Exercise SE or participants' beliefs in being able to regularly exercise in spite of real or perceived barriers, seems to be an important component of initiation and adherence to exercise programs.

Summary

This study will explore cognitive behavioral determinants of exercise. It will focus on the role of self-efficacy, and components of the theory of planned behavior, in relation to exercise behavior. The ability of the two theories to predict exercise participation in a structured exercise program in a population of elderly females will be examined.

CHAPTER 3 METHODOLOGY

Purpose

The purpose of this study was to investigate two cognitive behavioral theories in order to determine if they predict exercise behavior in a population of elderly women.

Research Design

The design of this study is a non-experimental, cross-sectional, comparison group study of older women's participation in a structured exercise program.

Setting

The project was conducted at a retirement community in north central Florida. Permission was obtained from the President of the community to conduct this study. The community is located in a rural setting approximately 75 miles northwest from the University of Florida, and is home to more than 800 permanent residents, mostly retirees and their families. There is a medical clinic staffed with a physician, physician assistants, nurse practitioners, and registered nurses. The Copeland Community Center, the recreational facility for residents, has an indoor pool, sauna, game rooms, conference rooms, and an exercise facility containing 3 treadmills, 3 stair-climbers, 3 stationary cycles, an assortment of free weights, and 8 strength training (weight-stack) machines. The Copeland Center has been the hosting facility for several University of Florida exercise research studies. Most of the data for this study were collected in the Copeland Conference room.

Sample

Permission was obtained from the principal investigator (PI) of the ongoing exercise study to ask subjects enrolled in the study to participate in this project. The PI of the exercise study recruited subjects for the exercise study by a direct mailing to over 240 female residents of the community. Subjects selected for the exercise study were healthy, non-smoking women between the ages of 60 and 75 years. All subjects were sedentary (were not currently exercising on a regular basis and had not done so for the previous 12 months), and were not taking hormones or osteoporosis medications. Following an initial screening and testing battery, the subjects were randomly assigned to an exercise group (n=9) or a non-exercise group (n=10).

All subjects in both groups of the exercise study were asked to volunteer to participate in this project. In addition, an equal number of women were recruited from the community. This group consisted of women who met the eligibility requirements, had been notified of the exercise study and had decided not to participate. These subjects were recruited by flyers posted throughout the community and by word of mouth.

Inclusion/exclusion criteria: The inclusion and exclusion used in this project was identical to that used in the exercise study. Subjects were excluded from the study if their medical history or physical examination demonstrated evidence of significant cardiovascular disease or other disorders that prevented safe participation in the study.

The following conditions were considered exclusionary:

1. Hospitalizations within the past 12 months for angina pectoris, myocardial infarction, coronary artery revascularization procedures (angioplasty and/or coronary artery bypass-graft surgery), or any other cardiac surgeries.
2. Congestive heart failure.
3. Cardiac pacemakers.

4. Heart rate > 100 or < 50 at rest.
5. Blood pressure (uncontrolled or controlled by medications): Testing systolic blood pressure > 160 mmHg and/or resting diastolic blood pressure > 100 mmHg.
6. History of spinal or hip fractures, or hip or knee arthroplasty.
7. Visual acuity in either eye less than 20/50 (corrected) measured by the standard Snelling test.
8. Diabetes mellitus or other metabolic or endocrine disorders requiring hospitalization within the past 12 months.
9. Smoking, alcohol or drug abuse.
10. Neuromuscular or orthopedic limitations to normal, unassisted ambulation.
11. Score less than 20 on the Mini-Mental State Examination (MMSE, Folstein, Folstein, & McHugh, 1975).
12. Any other medical or psychiatric conditions, which in the opinion of the investigators or the subject's personal health care provider would make participation in the study not in the subject's best interest.

There was no exclusion of subjects based on race or ethnic origin.

Procedures

Subjects who were recruited for this study, were informally interviewed in person or by phone to determine eligibility for the study. After volunteering, subjects were met individually or in small groups (of 2 to 4 persons) for a brief meeting with the principle investigator. Details and purposes of the research project were discussed and subjects had an opportunity to ask questions. Informed consents were read and signed by the volunteers. A demographic/medical history form was completed and the Mini-Mental State Exam (MMSE, Appendix A) was administered. Blood pressure and pulse was recorded and visual acuity was tested using the standard Snelling chart. Subjects then read and completed the instruments.

Procedure for Protection of Subjects

All subjects completed an informed consent document approved by the University of Florida Health Sciences College Institutional Review Board. All subjects were assigned a confidential study code number; no names or other identifying information were associated with the data. Data were stored in a locked file cabinet solely available to the investigator. Lists of participants were kept separate from the data and will be stored in locked cabinets available only to the investigator. After the research was completed, individual data was stored by study code number in locked file cabinets and solely available to the investigator. No names or other identifying information was associated with the data. Lists of participants including any identifying information were destroyed. Informed consents will be kept on file for seven years with the information regarding the study.

Instruments

The Osteoporosis Self-Efficacy Scale

(OSES; Appendix B), developed and evaluated by Horan, Kim, Gendler, Froman and Patel (1998), is a self-administered instrument, worded at a sixth grade readability level, which consists of 21 items in a visual analog format. The scale includes two subscale measures for exercise self-efficacy and nutritional self-efficacy. Only the exercise subscale items of the instrument were used for this study. The lower anchor of a 10-cm line is labeled "not at all confident" and the upper end is labeled "very confident". The phrase below is used as a stem for each item:

"If it were recommended that you do any of the following this week, how confident would you be that you could..."

Items include such tasks as:

1. begin a new or different exercise program
2. exercise for the appropriate length of time
3. do exercises even if they are tiring.

Subjects were asked to indicate the degree of confidence that they felt in their ability to do the activity by placing an X on the line that is calibrated from 0 to 100mm for analysis.

Horan and colleagues (1998) evaluated the construct validity of the OSES by comparing responses on the instrument from 201 women, ages 35 to 95, with responses on the Atherosclerosis Risk in Communities/Baecke Habitual Physical Activity Questionnaire (Baecke, Burema, & Frijters, 1982). This instrument measures self-efficacy on a sport/leisure scale and on a general exercise scale. Controlling for biographic variables (age, height, and weight) and experiential variables (years of education, friends, family, or both with osteoporosis), the OSES had a correlation of 0.52 ($p < 0.01$) with the sport/leisure scores and a correlation of 0.65 ($p < 0.01$) with the general exercise scores of the Baecke instrument. Horan & colleagues' study (1998) revealed a Cronbach's alpha measure of 0.94 for the exercise portion of the OSES. For this study, the Cronbach's alpha score for the OSES was 0.92, demonstrating a similar reliability score, as was previously reported by Horan and colleagues (1998).

For this study, the OSES was used because it had already been administered to all of the exercise study group participants and the scale included measures of exercise self-efficacy embedded within the scale. Only subscale items measuring exercise self-efficacy were used for statistical comparison between groups.

The remaining three instruments: The Fitness Attitude Scale (FAS), The Expectations of Others Scale (EOS) and the Perceived Behavioral Control Scale (PBCS, Appendixes E, D, and E) were developed by professionals in exercise physiology and were tested and published by Kerner and Grossman (2001). Items were submitted to five experts in clinical psychology and exercise physiology who were asked to judge the instruments for content validity. Each expert evaluated items for content within the respective constructs of fitness attitude, subjective norm, and perceived behavioral control. Items were evaluated by selecting only those that measured the aforementioned constructs. Each tool was created and tested separately and an item analysis was conducted for each version of each scale to identify those items that formed an internally consistent scale and to eliminate those items that did not. Scale reliability analyses for each instrument was also measured for this study and are individually reported in the text below.

The Fitness Attitude Scale

The FAS was developed to measure the individual's attitude toward exercise behavior (Kerner & Grossman, 2001). Validity of the initial 46-item scale was demonstrated by the authors through a process of four separate administrations of the scale (to samples of 24-26 respondents) during its evolution. Throughout this process, scale items were revised and shortened to reword and eliminate items that contributed to negative or low corrected item-total correlations. The alpha coefficient scores of the first two administrations were 0.89 and 0.95. The third version of the FAS scale contained 53 items and an alpha coefficient score of 0.90. All items with an r -value less than 0.39 were removed as well as 20 somewhat redundant statements. Nineteen items

remained for the final version of the scale and reliability analysis of these remaining items revealed an alpha coefficient score of 0.87. One of the 19 items was not used in this particular study since it pertained specifically to business executives and the population of this study was retired older adult women. The alpha coefficient of the scale in this study was 0.872, reflecting the internal reliability scores that were demonstrated by the scale authors.

The Expectations of Others Scale

The EOS developed by Kerner and Grossman (2001), sought to measure the individual's belief regarding a significant other's opinion of their exercise behavior. The 7-item, initial version of the scale was administered to a sample of 26 respondents. The alpha coefficient of the EOS was 0.84. Corrected item total correlations demonstrated moderate to high scores (from 0.39 to 0.83), indicating an internally consistent instrument; the authors reported no subsequent alterations of the EOS. The alpha coefficient of the EOS for this study was 0.912, measuring slightly higher than the reported reliability.

The Perceived Behavioral Control Scale

The PBCS, also developed by Kerner and Grossman (2001), aims to measure an individual's degree of perceived ease or difficulty with exercising. The three item, initial version of the PBCS was administered to a sample of 26 respondents. The alpha coefficient of the initial version of the PBCS was 0.82. The corrected item-total correlations from the scale items were relatively high, ranging from 0.68 to 0.77, indicating internal consistency of the scale. The alpha coefficient for the scale in this study was similarly measured at 0.764.

Data Analysis

Data were entered into an SPSS™ statistical software program by the investigator. Twenty percent (20%) of the completed questionnaires were randomly sampled, and a second data entry person checked entered values for errors. No errors in data entry were found; therefore no further data review was required. Data were analyzed using descriptive and inferential statistics.

Descriptive statistics were used to analyze the demographic data. Hypotheses of this study were addressed using an independent *t*-test to examine the variables and to compare the relationships between the groups. Differences in self-efficacy, fitness attitude, expectations of others and perceived behavioral control of the two groups were examined. Correlation statistics were used to compare the groups on demographic characteristics and to determine relationships among the instruments.

Missing Data

It was discovered after data collection was completed that 14 of the 39 subjects had completed questionnaires that were missing page 2 of the instrument. The missing questions were mostly questions from the nutritional subscale portion of the instrument, however there were two of the 10 exercise subscale questions that were omitted in this group. For this reason, statistical analysis was run on only the eight exercise-related questions that were completed by the entire sample.

On the other scales, for subjects with only one missing item, the mean total for the scale was calculated using the mean for the completed scale items. If more than one missing item was found, then the subject was not used for the statistical measurements for that analysis.

CHAPTER 4 DATA ANALYSIS AND RESULTS

The purpose of this research was to examine the cognitive behavioral determinants of participation in a structured exercise program. In other words, why would some women volunteer for a potentially beneficial exercise research program while others would not? Statistical analysis was done to examine whether the constructs of either behavioral theory predicted participation in the exercise study. First, demographics of the study population are presented, followed by the results of bivariate statistical analysis.

Characteristics of the Sample

The sample consisted of a total of 39 subjects who were residents of a retirement community in northern Florida. There were two groups involved, the volunteers and the non-volunteers. The volunteer group consisted of eighteen women currently participating in a different exercise research study. Nine of the 18 were subjects in the exercise study intervention group while 9 were controls for the exercise study. The non-volunteer group consisted of 21 women who were recruited for the exercise study but chose not to volunteer. The subjects were a homogeneous sample of retired women who met the inclusion criteria for the study. All subjects were women, white, and of European/American descent. There were no significant differences between groups regarding age, education level, health history status, weight, or marital status; however, the non-volunteer group took two thirds more

medications than the volunteer group and the mean differences in the MMSE scores were statistically, but not clinically significant. See Table 1 and 2 for further presentation of demographic data and differentiation between groups.

Table 1: DEMOGRAPHIC MEANS (n=39)

Variable	Mean of Volunteer Group (n=18)	Mean of Non-Volunteer Group (n=21)	r-value	p-value
Age	69.1	70.5	.164	.317
Total Years of Formal Education	14 years	13.85 years	-.031	.851
Health History (Total Number of Medical Problems)	5.7	5.0	-.180	.274
Medications Taken (Total Number)	1.11	3.14	.534**	<.001
Weight	170 lbs	158 lbs	-.288	.076
Smoking Status	2	2	-.299	.064
MMSE Score	29.05	29.75	.341*	.034

Table 2: MARITAL STATUS

Variable	Number		Percentage		r-value	p-value
Marital Status	Vols	Non-Vols	Vols	Non-Vols		
Married	14	12	78%	57%	.218	.182
Not Married	4	9	22%	42%		

Vols = volunteers, Non-Vols = non-volunteers

Data Analysis

All information was entered into an SPSS™ statistical program. Each of the four instruments was coded to calculate the mean scores for each subject. Only the first 8 items on the OSES were scored because 14 of the subjects were missing the second page of the scale. For subjects missing no more than one item on a scale, the mean from the answered items was entered manually into the SPSS™ database. Data from the mean scores were individually compared for statistical significance by using two-tailed *t*-tests for independent samples as shown in table 3.

Table 3: INDEPENDENT *t*-TESTS OF STATISTICAL SIGNIFICANCE

Scale	<i>Mean Scores</i>		<i>Std. Deviation</i>		<i>t</i> -test for Equality of Means	
	Volunteers	Non-Volunteers	Volunteers	Non-Volunteers	<i>t</i>	<i>p</i>
OSSES	86.63	72.36	7.19	22.55	2.570	.014
FAS	5.36	5.47	0.64	.66	-.605	.549
EOS	5.26	5.14	1.08	1.14	.323	.749
PBCS	5.59	5.08	0.99	1.39	1.303	.201

Pearson correlations were then examined in a correlation table to determine relationships between other variables. Results are reported in the text and in table 5.

Table 4: SIGNIFICANT CORRELATIONS BETWEEN THE GROUPS

	Group Status (Vol/Non-Vol)	OSES	FAS	EOS	PBCS
Number of Medications	$r=.534^{**}$	$r=-.233$	$r=.088$	$r=-.063$	$r=-.268$
Health History	$r=-.180$	$r=.087$	$r=.378^{*}$	$r=.293$	$r=-.008$
Smoking	$r=-.299$	$r=.235$	$r=.324^{*}$	$r=.150$	$r=.214$
OSES	$r=-.389^{*}$		$r=.099$	$r=.169$	$r=.293$
FAS	$r=.100$	$r=.099$		$r=.458^{**}$	$r=.227$
EOS	$r=-.053$	$r=.169$	$r=.458^{**}$		$r=.100$

* = $p < .05$, ** = $p < .01$

Research Hypotheses

There were four research hypotheses that guided inquiry for this study. Each hypothesis focused on a specific construct of the two cognitive behavioral theories that guided this study.

Hypothesis One

The first hypothesis stated: Women who volunteer to participate in the exercise study will have higher scores on the exercise-related items of an osteoporosis self-efficacy instrument than women who did not volunteer. The hypothesis was tested using the independent t -test for means of the OSES. Subjects who were exercise study volunteers scored higher on the exercise-related items of the OSES than the study non-volunteers, as shown in Table 3. Self-efficacy was not affected by age ($r=.13$, $p=ns$), education level

($r=-.061$, $p=ns$), health history ($r=-.087$, $p=ns$), smoking status ($r=.235$, $p=ns$), weight ($r=.203$, $p=ns$), or number of medications taken ($r=-.233$, $p=ns$). However, volunteers did score statistically higher on the exercise self-efficacy scale than non-volunteers ($r=-.389$, $p=.014$), thus supporting the hypothesis.

Hypothesis Two

The second hypothesis stated: Women who volunteered for the exercise study will have a more positive attitude toward fitness as measured by the FAS than women who did not volunteer. Measures of fitness attitude of the sample were compared to distinguish differences between the exercise study volunteers and the non-volunteers. It was thought that the decliners would have a poorer attitude toward fitness that would be measurable by the scale. This did not prove to be true in the study population. In fact, study non-volunteers scored slightly higher mean scores for the FAS than volunteers, as shown in Table 3, although the difference was not statistically significant. Thus the hypothesis was not supported. Fitness attitude was not affected by age ($r=.10$, $p=ns$), education ($r=-.279$, $p=ns$), smoking ($r=.287$, $p=ns$), weight ($r=-.246$, $p=ns$), or number of medications taken ($r=.008$, $p=ns$). However, fitness attitude had a significant positive correlation with health history ($r=.378$, $p=.019$), as the numbers of health problems increased, the fitness attitude scores increased. Expectations of others was positively correlated with fitness attitude ($p=.458$, $r=.004$), as the perception of others' expectations increased the fitness attitude also increased.

Hypothesis Three

The third hypothesis stated: Women who volunteered for the exercise study will believe that their significant others have higher expectations for them as measured by the

EOS than women who did not volunteer. While the volunteer group reported a higher mean EOS score, the difference between the groups was not statistically significant. As shown in Table 3, this hypothesis was not supported. Expectation of others was not affected by age ($r=.052$, $p=ns$), education ($r=-.125$, $p=ns$), health history ($r=.293$, $p=ns$), smoking ($r=.150$, $p=ns$) weight ($r=.023$, $p=ns$) or medications taken ($r=-.063$, $p=ns$). Expectation of others was positively correlated with FAS scores ($r=.458$, $p=.004$).

Hypothesis Four

The fourth hypothesis stated: Women who volunteered for the exercise study will perceive that they have more control over their behavior as measured by PBCS than women who did not volunteer. The mean scores of the volunteer group were slightly higher than the non-volunteer group, however it was not statistically significant to support the hypothesis, as shown in Table 3. PBCS was not affected by age ($r=-.157$, $p=ns$), education ($r=-.034$, $p=ns$), health history ($r=-.008$, $p=ns$), weight ($r=.075$, $p=ns$), or number of medications taken ($r=-.268$, $p=ns$). However, FAS had a significant positive correlation with higher rates of smoking ($r=.324$, $p=.047$). Smokers had a higher PBCS score than non-smokers.

Other Findings

Pearson correlations were done to determine the relationships between the demographic and research variables beyond those that were addressed by the study hypotheses. The non-volunteer group took nearly 66% more medications than the volunteer group (mean of 3.2 to 1.1), and this correlation was statistically significant ($r=.534$, $p<.001$). FAS were positively correlated with health history ($r=.378$, $p=.019$), as the numbers of reported health problems increased, fitness attitude improved. Fitness

attitude was also correlated with expectations of others ($r=.458, p=.004$) as the perception of others' expectations increased, the fitness attitude also improved. Finally, smokers in the study demonstrated a higher fitness attitude score ($r=.324, p=.047$) than non-smokers.

CHAPTER 5 CONCLUSION

Discussion of Research Findings

Examination of the demographics of the sample revealed what appeared to be a very homogeneous group, however there were some notable differences. For example, although the groups had similar numbers of reported medical conditions, the non-volunteer group reported taking a greater number of medications than the volunteer group (3.14 to 1.11 respectively), possibly indicating an increase in the degree of active medical problems or more severe medical problems than the volunteer group. Or perhaps the side effects of medications could be one reason for this group to refrain from volunteering for the study. This difference could reasonably affect self-efficacy and consequently a person's willingness to participate in an exercise intervention. Another explanation for this variance could be that those who volunteer may be more willing to look for alternative treatments for their medical conditions, such as exercise rather than medications. Or the volunteer group may have been more active and therefore required less medications. For this reason, they may have been motivated to seek out a structured exercise program with this in mind.

Bandura's self-efficacy theory was tested to see if it had some effect as a determinant of participation in a structured exercise program. His theory states that a person's confidence in their personal ability to carry out a task will effect their initiation of and adherence to a course of action. It was hypothesized that women who were more

confident in their exercise ability would be more likely to volunteer for an exercise study than those who had less confidence. Findings of this study did support the hypothesis. This is an important finding as it may be that only those with high self efficacy volunteer for structured exercise, perhaps missing a large group of those needing exercise help the most.

Constructs of the theory of planned behavior were tested to see if they had some effect on exercise participation in a structured program. Ajzen theorized that the constructs of attitude and subjective norm (other's expectations), affect intention to perform a behavior while perceived behavioral control directly affects intention and behavior. Relationships between the constructs and whether someone volunteered were not supported.

It was thought that women who would volunteer for the exercise study would also score higher on the FAS, but this was not found to be statistically significant. Personal conversation with the study participants revealed extraneous variables that may have affected their participation in an ongoing study. Several of the women mentioned that they were caregivers of an ill spouse. The demands of this responsibility dominated much of their time, energy and even social contacts. Therefore, caregiver burden rather than personal attitude may have reasonably affected their choices in exercise participation.

The higher EOS mean scores did not predict who volunteered for the exercise study. One possible explanation for this finding could be that the percentage of married women in the volunteer group was somewhat different than the non-volunteer group (78% married to 57% married, respectively). Although not statistically significant as a

direct correlation, marital status could have had an indirect effect on EOS scores.

Unmarried women may have difficulty answering questions that refer to significant others' expectations of them. Defining a "significant other" was difficult for some of the unmarried subjects. When using older subject groups, future research may need to rephrase this question. Perceived expectations from a spouse regarding exercise behavior may have encouraged participation in the volunteer group.

Fitness attitude was positively correlated with expectation of others. This correlation could be explained by the possibility that the fitness attitudes held by significant other people may affect the perceived expectations of the subject. If the significant other person had a positive attitude about exercise, then adopting a similar fitness attitude would be a logical consequence. Finally, smokers in the study demonstrated a higher fitness attitude score than non-smokers, perhaps because of their own felt need to compensate with a healthy action for their unhealthy smoking behavior. However, the small numbers of smokers may have artificially inflated this relationship. During conversation with the study participants, the smokers in the groups were very active and perhaps their personal health beliefs regarding smoking were that the unhealthy effects of smoking could be overridden by their participation regarding other healthy behaviors and therefore their attitudes regarding fitness were comparably strong.

The fourth hypothesis involving the construct of perceived behavioral control was not supported. There are many things that could have affected this variable. As mentioned above, the women who were caregivers had schedules that were largely affected by the needs of their ill spouses and therefore felt that they had little control over their own life. Others mentioned during conversation that they were "too busy" to

exercise, due to involvement with activities such as clubs, social organizations, church and volunteering. Health status may also affect perceived behavioral control if there are limiting factors due to a chronic illness or a medical condition.

Other Findings

Self-efficacy seemed to significantly affect exercise participation, but self-efficacy did not correlate with findings from the other scales. Intercorrelations of the scales were found between the FAS and the EOS. This was an interesting finding since that is not how the model of the TPB is conceptualized. According to the theory, attitude, expectations of others and perceived behavioral control all contribute independently to intention to act and thereby affect behavior. However, neither variable affected intention or behavior in this study.

Limitations

Design and Sample

A non-experimental, cross-sectional design was appropriate for this theoretically based study, however the small homogeneous sample size was a limitation to the power of the study as well as to the generalizability of the findings. The similarity in the lifestyles of the women was partially due to the uniformity of the community social structure within the retirement village and therefore the generalizable findings here are specific to a population meeting similar criteria and a similar lifestyle. Including men and women of more varied races and ethnic backgrounds and using a sample of retired adults from a variety of settings rather than just isolated retirement villages would make an interesting comparison. These same findings may not hold true for other samples and

lifestyles. Future research could build on this design and research could be conducted to replicate and strengthen this study.

Methodology

In the volunteer group the OSES was retrospectively collected. It had been administered by the PI of the exercise study just prior to the beginning of this study, so the participants in the volunteer group did not complete all four scales at the same time as the non-volunteer group did. Some of the volunteer subjects had already begun exercising; this may have had some effect on the other constructs, such as fitness attitude, since self-efficacy is thought to increase as one begins to succeed in a task. Prospective data collection strengthened the design for the remainder of the subjects, but the variance between groups may have been affected by the timing of the data collection. Providing instructions and questionnaires to all subjects at one point in time and before the intervention was initiated would eliminate personal interaction between the PI and the subject that could have heightened awareness of some of the concepts being studied.

Causality

Causality is limited by the many factors that are involved in making a decision to participate in a structured program. It is not possible to say that one particular theory, self-efficacy or theory of planned behavior, caused a response of volunteering for the structured exercise program. Experimental behavioral research testing the constructs of self-efficacy, attitudes, perceptions of others expectations and control over behavior could demonstrate a stronger cause and effect relationship. Limitations to internal validity in this study include the extraneous variables such as caregiver burden and subject medical conditions that may have affected responses to the

questions. Also, administration of the scales at different times and in different groupings may have had some effect on subject's responses. Some of the women complete the questionnaires while surrounded by a group of friends who discussed exercise and its implications at length, and this may have affected the responses of the group leading to a "group think" response.

Implications for Practice

The results provide support for practitioners to first test for low exercise self-efficacy among patients and subsequently develop interventions to increase one's perception of their self-efficacy to undertake an exercise program. Considerations for behavioral/nursing research imply that people who are less self-efficacious may not step forward to volunteer for studies of this nature. Improved recruiting strategies for research studies may be warranted in order to attract a more representative sample for exercise study populations.

APPENDIX A **MINI-MENTAL STATE EXAMINATION**

Maximum
Score Score

ORIENTATION

- | | | |
|---|-------|---|
| 5 | () | What is the (year) (season) (date) (day) (month)? |
| 5 | () | Where are we: (state) (county) (town) (building) (floor)? |

REGISTRATION

- | | | |
|---|-------|--|
| 3 | () | Name 3 objects: 1 second to say each. Then ask the subject all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until she learns all 3. Count trials and record. |
|---|-------|--|

ATTENTION AND CALCULATION

- | | | |
|---|-------|---|
| 5 | () | Serial 7s. 1 point for each correct. Stop after 5 answers. Alternatively spell "world" backwards. |
|---|-------|---|

RECALL

- | | | |
|---|-------|--|
| 3 | () | Ask for the 3 objects repeated above. Give 1 point for each correct. |
|---|-------|--|

LANGUAGE

- | | | |
|---|-------|--|
| 9 | () | Name a pencil and watch (2 points)
Repeat the following "No ifs, ands or buts." (1 point)
Follow a 3-stage command: "Take a paper in your right hand,
fold it in half, and put it on the floor" (3 points)
Read and obey the following: CLOSE YOUR EYES (1 point)
Write a sentence (1 point)
Copy a design (1 point) |
|---|-------|--|

_____ Total score

Assess level of consciousness along a continuum

Alert	Drowsy	Stupor	Coma
-------	--------	--------	------

APPENDIX B
OSTEOPOROSIS SELF-EFFICACY SCALE

Directions: Please read each of the following statements and indicate your feeling of confidence by marking an "X" on the line below the statement.

If it were recommended that you do any of the following this week, how confident would you be that you could?"

1. Begin a new or different exercise program

Not at all _____ Very confident
Confident

2. Change your exercise habits

Not at all _____ Very confident
Confident

3. Put forth the effort required to exercise

Not at all _____ Very confident
Confident

4. Do exercises even if they are difficult

Not at all _____ Very confident
Confident

5. Maintain a regular exercise program

Not at all _____ Very confident
Confident

6. Exercise for the appropriate length of time

Not at all _____ Very confident
Confident

7. Do exercises even if they are tiring

Not at all _____ Very confident
Confident

8. Stick to your exercise program

Not at all _____ Very confident
Confident

9. Exercise at least three times a week

Not at all _____ Very confident
Confident

10. Do the type of exercises you are supposed to do

Not at all _____ Very confident
Confident

11. Begin to eat more calcium-rich foods

Not at all _____ Very confident
Confident

12. Increase your calcium intake

Not at all _____ Very confident
Confident

13. Consume adequate amounts of calcium-rich foods

Not at all _____ Very confident
Confident

14. Eat calcium-rich foods on a regular basis

Not at all _____ Very confident
Confident

15. Change your diet to include more calcium-rich foods

Not at all _____ Very confident
Confident

16. Eat calcium-rich foods as often as you are supposed to

Not at all _____ Very confident
Confident

17. Select appropriate foods to increase you calcium intake

Not at all _____ Very confident
Confident

18. Stick to a diet that gives an adequate amount of calcium

Not at all _____ Very confident
Confident

19. Obtain foods that give an adequate amount of calcium

Not at all _____ Very confident
Confident

20. Remember to eat calcium-rich foods

Not at all _____ Very confident
Confident

21. Take calcium supplements if you don't get enough calcium from your diet

Not at all _____ Very confident
Confident

APPENDIX C

FITNESS ATTITUDE SCALE

We would like to learn about your views and attitudes toward fitness. "Fitness attitude" is defined as the ability to do your daily activities with vigor and without becoming tired.

Directions: Please read each of the following statements. There is a line scale directly under each statement. Indicate your opinion about the statement by circling the dot that most closely describes your answer.

Please look at the example to see how the question is answered. We will do the sample question together, and then you will do the rest by yourself.

EXAMPLE:

There is a large amount of snow fall in Florida each winter.



1. I think that the time I spend doing physical fitness activities is not wasted.



2. It is important for me to exercise frequently.



3. I would exercise more if I had the money.



4. Physical fitness activities improve my physical health



5. I have more control of my life as a result of my physical fitness activities.



6. Physical fitness activities contribute to my self-esteem.



7. People who exercise have more energy to continue their daily activities at the end of the day.



8. Exercise activities contribute to your overall sense of well being.



9. Physical fitness activities help my body to relax.



10. Fitness activities are good opportunities for developing social contacts.



11. I feel motivated when I accomplish the goals that I set for myself.



12. As a result of exercising I have more physical energy.



13. I believe that doing physical fitness activities is good for me.



14. Exercise activities let me mentally unwind.



15. I give physical fitness activities high priority among other activities.



16. People often develop friendships through their fitness activities.



17. Fitness activities help me to have more control over my eating behaviors.



18. Fitness activities allow me to draw more pleasure from other leisure activities.



APPENDIX D EXPECTATIONS OF OTHERS

Do you believe that significant persons in your life think that you should (or should not) engage in a program of physical exercise during the next 12 months?

"Significant other person" refers to specific persons in your life. They may include a parent, spouse, lover, friend, child, physician, or others that you feel are important and involved in your life right now.

Directions: Read each statement. Each statement has a scale beneath it. Circle the dot on the line that most closely matches your agreement with each statement.

Remember that we are not asking what you think, but what your significant other person thinks you should do.

Example:

My "significant other person" thinks that I should enjoy life to the fullest.



1. My "significant other person" thinks that I should reduce my body weight through physical exercise during the next twelve months.



2. My "significant other person" thinks that I should get into shape with a program of physical exercise during the next twelve months.



3. My "significant other person" thinks that I should reduce my blood pressure by exercising more during the next twelve months.



4. My "significant other person" thinks that I should get healthier by participating in a program of physical exercise during the next twelve months.



5. My "significant other person" thinks that I should reduce my stress by participating in a program of physical exercise during the next twelve months.



6. My "significant other person" thinks that I should participate in a program of physical exercise to help me feel good during the next twelve months



7. In general, how much do you want to do what your "significant other person" thinks you should do?



APPENDIX E

PERCEIVED BEHAVIORAL CONTROL SCALE

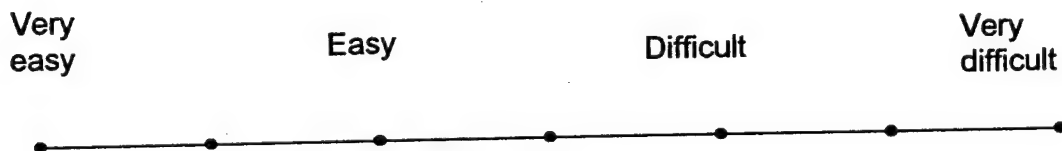
We would like to learn more about how much control you feel you have regarding your own personal exercise behavior.

Directions: Please read each statement. Using the scale below the statement, choose the dot on the line that most closely describes what answer you agree with. Circle the dot that you choose.

1. How much control do you have over whether you do or do not exercise on a regular basis?



2. For me to exercise on a regular basis is...



3. If I wanted to, I could easily participate in a structured exercise program on a regular basis.





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APPENDIX F
IRB APPROVAL

Health Center Institutional Review Board

PO Box 100173
Gainesville FL 32610-0173
Tele: (352) 846-1494
Fax: (352) 846-1497

MEMORANDUM

DATE: February 11, 2002
TO: Laurie Johnson
Box 100187
FROM: R. Peter Iafate, Pharm.D.
Chair, IRB-01
SUBJ: IRB Protocol #641-2001

Expires on 1/9/2003

TITLE: EXPEDITED: COGNITIVE BEHAVIORAL DETERMINANTS OF EXERCISE PARTICIPATION IN A
STRUCTURED PROGRAM

You have received IRB approval to conduct the above listed research project. Approval of this project was granted on 2/7/2002. Enclosed is the dated, IRB-approved Informed Consent Form that must be used for enrolling subjects into this project from 2/7/2002 - 1/8/2003.

You are responsible for applying for renewal of this project prior to the expiration date. Re-approval of this project must be granted before the expiration date or the project will be automatically suspended. If suspended, new subject accrual must stop. Research interventions must also stop unless there is a concern for the safety or well being of the subjects. You must respond to the continuing review questions within 90 days or your project will be officially terminated.

The IRB has approved exactly what was submitted. Any change in the research, no matter how minor, may not be initiated without IRB review and approval, except where necessary to eliminate hazards to human subjects. If a change is required due to a potential hazard, that change must be promptly reported to the IRB.

Any severe and unanticipated side effects or problems, and all deviations from federal, state, university or IRB regulations must be reported, in writing, within 5 working days.

Upon completion of the study, you are required to submit a summary of the project to the IRB office.

Research records must be retained for three years after completion of the research; if the study involves medical treatment, it is recommended that the records be retained for eight years.

If VAMC patients will be included in this project, or if the project is to be conducted in part on VA premises or performed by a VA employee during VA-compensated time, review by the VA Subcommittee for Research is required.

You are responsible for notifying all parties about the approval of this project, including your co-Investigators and Department Chair. If you have any questions, please feel free to contact the IRB-01 office at (352) 846-1494.

Cc: IRB File
Pharmacy
VA Research Center
Clinical Research Center

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BIOGRAPHICAL SKETCH

Laurie E. Johnson received an Associate degree in Nursing and Bachelor of Science degree in Nursing from Gardner-Webb University, Shelby, North Carolina, in 1987 and 1989. She then entered the United States Air Force Nurse Corps. She is currently a Major, serving her thirteenth year as an active duty military officer.

During her nursing career Laurie has held many leadership positions and has worked in the fields of medical-surgical, cardiac, pediatric, flight-nursing, hyperbarics, obstetrics and nursery. She holds a certification (RNC) in inpatient obstetrics through the National Certification Corporation. She is a member of the Association of Women's Health, Obstetrical and Neonatal Nurses (AWHONN) and has served as Hillsborough County AWHONN chapter coordinator for the last three years.

Laurie is the daughter of [REDACTED] and [REDACTED] (also an RN), daughter-in-law of [REDACTED] the wife [REDACTED] and the mother of [REDACTED]. She currently resides with her family and will begin her new role as a Women's Health Nurse Practitioner at the United States Air Force Academy, Colorado Springs, Colorado.